Inventions & Innovation Project Abstract

Use of Force Modulation in Press Cushions to Accelerate Lightweighting in U.S. Auto and Truck Production

With the onset of material instability in oil prices, spiraling global demand for additional oil supplies, and the growing concern with global CO2 levels/global warming, the demands for transportation technology are changing. A growing body of evidence suggests a change in consumer demands for auto fuel efficiency. Recent US sales show softening demand for SUV's and growing demand for more fuel efficient and environmentally friendly vehicles, including hybrids. The US auto industry is moving down at least two parallel paths to address these market evolutions: design changes in the engine plant (improved internal combustion engines, hybrids and alternate fuel engines), and changes in the materials used to build vehicle frames and bodies, thereby reducing weight and improving fuel efficiencies.

Auto and truck lightweighting efforts center on the use of newer, stronger, and lighter materials for frames and bodies, including high strength steel (HSS) and advanced high strength steel (AHSS). In order to use these materials, standard forming technologies simply will not work. A key barrier to HSS and AHSS forming is the generation of sufficient blank holding tonnage to control metal flow during the forming process.

Researchers are finding that work holding capabilities in excess of 600 tons will be required to form the higher strength steels. With the exception of this Force Modulator technology from Metalforming Controls Corporation, there are no commonly used technologies on the market with that capability. With significant support from Daimler-Chrysler Corporation, this project will use the Force Modulation technology to develop a production press cushion and then test/demonstrate use of the cushion in a six month production project at a Daimler-Chrysler stamping plant. If the project is successful, it will achieve the following objectives: design and construction of a 600 or more ton Force Modulation Cushion; installation into an operating press line; operation in six months of production; demonstration of the system function, reliability, and maintainability; and demonstration of system capability to support consistent HSS part quality during production. The project will also provide the automotive industry with a cost-effective tool to accelerate the US vehicle lightweighting effort, reduce the costs of producing HSS parts, and offer field data to support rapid adoption of this technology.

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